Anggrahini Arum Nurpratiwi, 2018. Pengaruh Penambahan Polivinil Alkohol terhadap Karakteristik Mikroskopik Pizoelektrik $BaTiO_3$. Skripsi ini dibawah bimbingan Jan Ady, S.Si, M.Si dan Drs. Siswanto, M.Si. Program studi S1-Fisika, Departemen Fisika, Fakultas Sains dan Teknologi, Universitas Airlangga, Surabaya.

ABSTRAK

Telah dilakukan penelitian mengenai pengaruh penambahan polivinil alkohol terhadap karakteristik mikroskopik pizoelektrik $BaTiO_3$. Sintesis *barium titanate* dilakukan menggunakan metode *sol-gel* dengan mencampurkan bahan-bahan dasar yaitu *barium carbonate, titanium dioxide, ammonium hydroxide, nitric acid, polivynil alcohol,* dan aquabidestilata yang dipanaskan diatas *magnetic stirrer* dengan temperatur 90 ^oC. Parameter yang divariasikan adalah rasio berat *barium titanate* dan larutan 10% polivinil alkohol (PVA) sebesar 1:0 (kontrol), 1:1, dan 1:2 dengan variasi temperatur sintering masing-masing 700^o, 800^o, dan 900^{o}C. Pada proses *thermal treatments*, dilakukan tahap menghilangkan gas-gas dan kadar air pada suhu 150 ^oC selama 1 jam, tahap kalsinasi selama 24 jam pada suhu 250 ^oC, dan tahap sintering dengan variasi suhu sintering selama 2 jam. Hasil uji XRD *(X-Ray Diffraction)* menunjukkan bahwa senyawa $BaTiO_3$ terbentuk setelah di *sintering* pada temperatur 700^{o}C, 800^{o}C, dan 900^{o}C selama 2 jam dan terbentuk fasa tunggal $BaTiO_3$ tetragonal pada sampel dengan perbandingan $BaTiO_3$:PVA sebesar 1:0 pada temperatur sintering 800˚C dan 1:1 dengan temperatur sintering 800˚C dan 900˚C. Hasil uji PSA *(Particle Size Analyzer)* mengindikasikan jika serbuk $BaTiO_3$ mempunyai ukuran partikel pada kisaran nano sebesar 60% yaitu 50 – 95 nm dan 40% sisanya berukuran mikro yaitu 100 – 165 nm. Berdasarkan hasil pengukuran densitas, dengan nilai literatur sebesar 6,02 gram/cm^3, terdapat selisih rata-rata sekitar 4 – 3 gram/cm^3 atau sekitar 44% – 64% pada metode kering dan 0,5 – 2 gram/cm^3 atau sekitar 7% – 40% pada metode basah (Archimedes).

Kata kunci: *Barium Titanate ($BaTiO_3$),* fasa tunggal, metode sol-gel, pizoelektrik.

Anggrahini Arum Nurpratiwi, 2018. The Effect of The Addition of Polyvinyl Alcohol on The Microscopic Characteristic of $BaTiO_3$ Piezoelectric. This final assignment was under the guidance of Jan Ady, S.Si, M.Si and Drs. Siswanto, M.Si. Physics Undergraduate Study Program, Physics Department, Faculty of Science and Technology, Airlangga University, Surabaya.

ABSTRACT

Research has been conducted on the effect of the addition of polyvinyl alcohol on the microscopic characteristics of $BaTiO_3$ piezoelectric. The synthesis of barium titanate was carried out using the sol-gel method by mixing basic ingredients, such as barium carbonate, titanium dioxide, ammonium hydroxide, nitric acid, polyvinyl alcohol, and aquabidestilata which were heated on a magnetic stirrer with a temperature of 90˚C. The parameters that varied were the weight ratio of barium titanate and 10% polyvinyl alcohol (PVA) solution which were 1: 0 (control), 1: 1, and 1:2 with sintering temperature variations of 700˚C, 800˚C, and 900˚C respectively. In the thermal treatment process, conducted gases and moisture content removal process were conducted at a temperature of 150˚C for 1 hour, calcination process for 24 hours at a temperature of 250˚C, and sintering process with a variation of sintering temperature for 2 hours. XRD (X-Ray Diffraction) test results show that the $BaTiO_3$ compound was formed after sintering at temperatures of 700˚C, 800˚C, and 900˚C for 2 hours and a single $BaTiO_3$ tetragonal phase was formed on a sample with $BaTiO_3$: PVA ratio of 1: 0 at sintering temperature of 800˚C and 1: 1 with sintering temperatures of 800˚C and 900˚C. PSA (Particle Size Analyzer) test results indicate that $BaTiO_3$ powder has particle size in the range of nanometers for 60% i.e. 50-95 nm and the remaining 40% are micro-sized i.e. 100-165 nm. Based on the result of density measurements, with a literature value of 6.02 grams / cm3, there is an average difference of 4 - 3 grams / cm^3 or about 44% - 64% in the dry method and 0.5 - 2 grams / cm^3 or about 7 % - 40% on wet method (Archimedes).

Keywords: Barium Titanate ($BaTiO_3$), Single Phase, sol-gel method, piezoelectric.